R E P O R T R E S U M E S

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AN 8-WEEK SUMMER INSTITUTE TRAINING PROGRAM TO RETRAIN OFFICE EDUCATION TEACHERS FOR TEACHING BUSINESS ELECTRONIC DATA PROCESSING.

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THE CONDUCT OF AN 8-WEEK INSTITUTE IN DATA PROCESSING FOR BUSINESS AND MATHEMATICS TEACHERS WAS THE PURPOSE OF THE PROJECT. THE PROJECT OBJECTIVES WERE (1) TO RETRAIN TEACHERS WITH A MINIMUM OF 3 YEARS, TEACHING OR WORK EXPERIENCE IN BUSINESS OR OFFICE OCCUPATION AREAS FOR TEACHING DATA PROCESSING, (2) TO ASSIST WITH THE DEVELOPMENT OF KNOWLEDGE AND SKILLS ESSENTIAL FOR TEACHING SPECIALIZED COURSES IN CURRICULUMS DESIGNED TO PREPARE COMPUTER PROGRAMERS AND/OR APPLICATION ANALYSTS, (3) TO FURTHER DEVELOP SUGGESTED COURSE MATERIAL INCLUDING COURSE CONTENT, REFERENCES, VISUAL AND OTHER INSTRUCTIONAL AIDS SUITABLE FOR USE AS PATTERNS AND GUIDELINES FOR FUTURE PROGRAMS, AND (4) TO DETERMINE HOW EFFECTIVELY THE ABOVE OBJECTIVES HAD BEEN ACCOMPLISHED IN THE VIEW OF THE PARTICIPANTS OF THE 1963, 1964, AND 1965 INSTITUTES. THIRTY-THREE PARTICIPANTS WERE OFFERED TWO PROGRAMS. TWENTY-FOUR PARTICIPANTS ATTENDED THE FIRST-YEAR PROGRAM AND NINE THE SECOND-YEAR PROGRAM. ALL PARTICIPANTS COMPLETED THE PROGRAMS. A QUESTIONNAIRE WAS MAILED TO PARTICIPANTS WITH A 55 PERCENT RETURN. RESULTS INDICATED THAT--(1) 13 OF THE 37 RESPONDENTS HAD TAUGHT AT LEAST 1 COURSE BEFORE ATTENDING THE INSTITUTE, (2) 34 TAUGHT COURSES IN DATA PROCESSING AFTER ATTENDING AT LEAST 1 INSTITUTE, AND 3 DID NOT, (3) HANDOUT MATERIALS WERE MOST HELPFUL, (4) THE MATHEMATICAL TRAINING WAS LEAST HELPFUL, (5) 31 OF THE 37 RESPONDENTS EITHER RETURNED TO THE SECOND-YEAR INSTITUTE OR STATED THEY WOULD LIKE TO, (6) 21 OF THE RESPONDENTS TAUGHT COURSES IN 2-YEAR PROGRAMS, AND 5 ARE WORKING AT INSTITUTIONS DEVELOPING 2-YEAR CURRICULUMS, AND (7) MOST OF THE RESPONDENTS HAD ASSOCIATES IN DATA PROCESSING AT THEIR INSTITUTIONS, BUT 8 INDICATED THEY WERE THE ONLY TEACHERS. (HB)

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Dr. Norman E. Watson
District Superintendent

Orange Coast College
2701 Fairview Road
Costa Mesa, California

Vocational and Technical Education Grant, Contract No. OE-585-096

Vocational Education Act of 1963, Section 4(c)

June 21, 1965 to August 13, 1965

The Project Reported Herein Was Supported by a Grant from the

U. S. Department of Health, Education and Welfare,

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I. PROBLEM

In the last few decades, technological advances in automated data processing techniques and equipment have created a need on the part of industry and government for trained technicians in this field. International Business Machines Corporation statistics report that today there are 26,000 IBM computers in use requiring some 80,000 computer programmers, 60,000 analysts and 100,000 other supporting personnel. In ten years the need for programmers alone is expected to rise to over 175,000. Currently, there is a serious shortage of trained personnel in this field and the future promises even greater demand. It will be difficult, if not impossible, to provide the programmers and analysts who are needed without qualified instructors who are prepared to teach data processing in secondary school and college curricula.

If the shortage of operating personnel in data processing is severe, the shortage of qualified teachers in this field is critical. Of the more than seventy junior colleges in California, less than a dozen are able to offer well-developed programs in business or scientific data processing to their students.

Those junior colleges which do offer such programs all experience great difficulty in attracting competent teaching staff. Moreover, colleges which have been able to find teachers have experienced difficulty in finding means by which the teachers can keep abreast of this most dynamic field. Secondary-school programs in data processing are even fewer in number in California. In fact, there are no full-scale "programs" on the high school level, most institutions offering only one and at most two courses in the field.

The problem faced by this project was that of preparing teachers of business or mathematics to teach data processing in junior colleges and secondary schools and to develop vocational data processing programs at these grade levels.

II. OBJECTIVES

The main objective of this project was to conduct an eight-week Institute in data processing for business and mathematics teachers. The Institute was divided into two sections, one for those who had not attended the Institute the previous year; the other for those who had. These two sections will be referred to hereafter as the First-Year Group and the Second-Year Group. The Institute was held during the summer of 1965 and was the third of a series of Institutes, the others having been held during the summers of 1963 and 1964.

A further objective was to evaluate the usefulness which teachers who had participated in the three Institutes found in the materials studied. Essentially, this objective tested the hypothesis that teachers of business or mathematics could be retrained during two eight-week summer sessions to teach basic courses in a two-year vocational program in data processing. Specifically, the courses that the Institutes prepared these teachers to conduct were as follows:

First Year: Introduction to Data Processing
Unit-Record Machine Wiring and

Operations

Basic Electronic Data Processing and
Computer Programming

Second Year: Computer Programming

Computer Operating Systems

Business Systems Design and Analysis

III. PROCEDURE

A. Course Content

Participants in the Institute attended class for eight weeks, five days per week, seven hours per day. In addition, four evenings per week at three hours per evening were spent in field trips, special lectures, seminars or laboratory work.

Outlines of materials presented during classroom hours are shown as Appendices I and II.

B. Seminars and Special Lectures

Seminars and special lectures were conducted as follows:

1. An IBM representative conducted a seminar on new remote-console devices with school educational and administrative potential.
2. A special lecture, presented by an IBM representative, on the IBM System 360 was presented.
3. A presentation was made by Ketchum Electronics of a computer logic teaching device they manufacture.
4. A lecture on the methods of teaching boolean algebra

was presented by the Head, Electronics Department, Chaffey College.

C. Take-Home Materials

Take-home materials were provided for both First-Year and Second-Year Groups. Cost prohibits including those materials (amounting to over a thousand pages) with this report. They included bibliographical material, lecture outlines, machine schematics, overhead transparency source documents, and recent articles written by authorities in the field.

D. Tours and Field Trips

Tours and field trips were made to the following installations:

1. U.S. Suzuki Company, Santa Ana, California, a unit record installation preparing for a disk system. The Data Processing Manager described the systems analysis involved in conversion from a unit-record installation to a computer installation.
2. Collins Radio Company in Newport Beach, California, a large computer installation. After a tour of the facilities, a seminar was conducted which discussed problems of data transmission and reception.
3. Hunts Foods, Inc. in Fullerton, California, a 1410 tape system, serving the data processing needs of a national company. The post-tour discussion concerned the flow of work through a computer installation and related personnel scheduling problems.
4. Bank of America IRMA Installation, a large computerized

check processing application. A tour of the installation was preceded by an explanation of how the system works from both a hardware and a systems standpoint.

E. Special Features

These special features were also included:

1. Hands on training: all problems and programs prepared by the participants were executed on the three computers and complete EAM installation available in the college's Data Processing Center.
2. Integrated into the Introductory Course materials was classroom discussion of vocational education techniques, pedagogy of data processing training, data processing course preparation, and data processing curricula preparation.
3. A mid-course barbecue helped to relieve the strain of the program. This was held in a local park where recreational facilities were made available to the participants. This welcome relief from the routine provided a remarkable lift in morale and performance.
4. A post-Institute banquet was held at the close of the Institute at a local country club.

F. Evaluation

In order to evaluate the usefulness which teachers who had participated in the Institutes found in the materials presented, a questionnaire was designed and mailed to the sixty-seven teachers who completed either one or two summers. This questionnaire is included with this report as Appendix III. Thirty-seven completed questionnaires were returned.

The returned questionnaires were examined with a view to determining:

1. The degree to which the Institutes prepared teachers who had not taught data processing prior to attending the Institute to teach it after attending, and the degree to which experienced data processing teachers found the Institute valuable.
2. Which aspects of the Institutes the participants found most helpful in their data processing teaching assignments and which aspects the participants found least helpful.
3. The degree to which participants of First-Year sessions desired to return for the Second-Year program.
4. The degree to which participants recommended the First-Year program to their teaching colleagues.
5. The number of participants who taught in two-year data processing programs as opposed to those who taught in schools offering only one or two courses, and the number of participants who were actively engaged in developing a two-year data processing curriculum at their schools.
6. The degree to which the participants had been exposed to training in the history, philosophy and pedagogy of vocational education prior to attending the Institute.

G. Staff

The teaching staff of the Institute was as follows:

Richard W. Brightman:
Director, Business Data Processing, Orange Coast College
A.A., Orange Coast College, 1959, Business Management
A.B., Stanford University, 1961, Economics
M.B.A., Stanford Graduate School of Business, 1963
Marketing
Graduate Study in Data Processing at California State College at Fullerton
I.B.M. classes, Los Angeles

Theodore Tilton:
Assistant Professor, Data Processing, Mathematics, Orange Coast College
B.A., Long Beach State College, Long Beach, Calif., Mathematics
5 years industrial experience - computer type

Donald E. McKee:
Assistant Professor, Data Processing, Orange Coast College
B.S., University of California, Los Angeles, Business Administration
M.B.A., University of California, Los Angeles, Marketing
3 years experience with IBM Corporation

Bernard J. Luskin:
Assistant Dean of Admissions and Records, Orange Coast College
A.A., Long Beach City College, 1958, Business Administration
B.A., California State College at Los Angeles, 1961, Accounting
M.A., California State College at Long Beach, 1964, School Administration
IBM Computer Classes, Los Angeles
Graduate Study in Data Processing at Calif. State College at Fullerton
Graduate Study, U.S.C.

Richard W. Reynolds:
Instructor, Data Processing, Business Administration, Orange Coast College
B.S., New York University
M.B.A., New York University
18 years experience in business, including systems and management consulting; managerial positions

Laboratory assistants and clerical help were as follows:

Joseph Seuss, Laboratory Assistant
A.A., Orange Coast College, Business Data Processing
B.S., California State College at Long Beach, California

Michael Cross, Laboratory Assistant
A.A., Orange Coast College, Business Data Processing
A.B., California State College at Fullerton, California

Gary Mahan, Laboratory Assistant
A.A., Orange Coast College, Business Data Processing

Mrs. Alice Scofield, Secretary

H. Equipment

Equipment available at Orange Coast College's Data Processing Center is listed below. Participants were given opportunities to operate all of the equipment in pursuit of their studies during the program.

Computers:

IBM 1401 Computer - Model B, with Disk File
General Precision LGP-30 Computer
IBM 1620 Computer with Disk File

EAM Equipment:

IBM 024 Card Punch (3)
IBM 026 Printing Card Punch (8)
IBM 056 Card Verifier
IBM 063 Card to Tape Punch
IBM 082 Card Sorter
IBM 085 Collator
IBM 402 Accounting Machine
IBM 514 Reproducing Punch
IBM 548 Interpreter
IBM Type 901 (063-514) Wiring Panels (31)
IBM Type 911 (548) Wiring Panels (16)
IBM Type 912 (085-602A) Wiring Panels (58)
IBM Type 917 (402) Wiring Panels (32)

Other Card Equipment:

Royal McBee Tabulating Punch (2)
Royal McBee Keysort Data Punch
Royal McBee Keysort Edge Punch
Royal McBee General Records Poster (18)

Miscellaneous Equipment:

Autotutor Mark IV (2)
Friden Flexowriter (3)
Friden Flexowriter Programatic W/Selectadata
MINIVAC 601
NCR Desk Calculator W/Tape Punch
NCR Bookkeeping Machine
Printing Calculators (2)
Rotary Calculators (4)

I. Budget

The budget expenditures for the Institute as of January 1, 1966 are as follows:

1.	Total cost		$50,861.46
2.	Cost of instruction:		
	Teaching and clerical staff	$14,230.00	
	Supplies	763.86	
	Equipment maintenance and rental	2,971.60	
	Use of facilities	2,397.00	
	Travel to conference	596.92	
			20,959.38
3.	Cost of maintenance and travel of participants		29,902.08
4.	Amount of federal funds used		44,782.86
5.	Amount of state funds used		0.00
6.	Amount of local funds used		6,078.60

IV. PARTICIPANTS

Participants were recruited from a seventeen-state area. Brochures describing the program were distributed through the California State Director of Vocational Education and the Director of the Orange Coast College Summer Institute in Data Processing. Applications were prepared by the prospective participants, and signed by the State Director of Vocational Education in the applicant's state. Applications were processed by the Institute Director.

Criteria for selecting First-Year applicants were as follows:

1. Bachelor degree in business education, mathematics, or equivalent; preferably one year of study in accounting.

2. At least three years of teaching experience or combination of teaching and work experience in the field of business.

3. Currently employed as a teacher, department chairman, or equivalent position that requires current knowledge of the field of business or data processing.

4. Recommended by State Director of Vocational Education of applicant's state.

Criteria for selecting Second-Year applicants were as follows:

1. Satisfactory completion of 1963 or 1964 first year Business Data Processing Teacher Education Summer Institute, or

2. Previous experience as a teacher of computer programming or work experience in industry or business for admission purposes for anyone who had not completed the first year program.

3. Currently employed as a teacher, department chairman, or equivalent position that required current knowledge of the field of business or data processing.

4. Recommended by State Director of Vocational Education of applicant's state.

Thirty-three applicants were accepted into the Institute, twenty-four First-Year, nine Second-Year. All applicants who were accepted attended the Institute. The following states were represented with the number of students from each state as indicated:

California	27 participants
Nevada	4 participants
Oregon	1 participant
Arizona	1 participant

The Second-Year group was composed of California teachers with the exception of one from Arizona.

Thirty-one participants indicated that they expected to

teach data processing courses as part of an occupational preparatory curriculum during the 1965-1966 school term. All of the Second-Year participants taught data processing during the 1964-1965 school year and intended to continue during 1965-1966.

V. RESULTS

Unlike the Institutes of 1963 and 1964, all the participants who enrolled for the summer of 1965 finished the program. In large part, this was the result of the financial support received by the participants of the third Institute which was generally not available to those of the first two.

The California State College at Fullerton, California awarded upper-division college credit to those participants who paid tuition at $14.00 per unit. A maximum of eight units of credit could have been earned for the eight weeks' work. The credit was awarded in increments of two units. Of the thirty-three participants in the Institute, thirty-one received the full eight units of credit while two participants received two units each. Letters of completion were awarded to those who requested them in order to satisfy local school district regulations regarding salary schedule advancement.

An examination of the thirty-seven returned Student Follow-Up Questionnaires yielded this information.

1. Thirteen of the thirty-seven respondents had taught at least one course in data processing before attending the

Institutes. Thirty-four respondents taught courses in data processing after attending at least one summer at the Institute; only three respondents indicated that they taught no data processing after attending.

2. Respondents indicated that hand-out materials provided them during the Institute and the training they received with respect to unit-record equipment were most helpful to them in their teaching situations. A complete listing of those items in question four of the questionnaire which were indicated as most helpful by the respondents is given below.

Item	Number of respondents who felt this was most helpful
Hand-out materials received	8
Bibliographical materials received	1
Course outlines developed at the Institute	2
Historical background	1
Mathematical background	2
Unit record equipment	8
Computer programming	2
Generally helpful	5

In eight cases, it was impossible to determine which of the above categories was found to be most helpful by the respondent.

3. More respondents indicated that mathematical background training was least helpful to them than any other category.

Item	Number of respondents who felt this was least helpful
Hand-out materials received	0
Bibliographical materials received	3
Course outlines developed at the Institute	3
Historical background	2
Mathematical background	6
Unit record equipment	1
Computer programming	4
Generally unhelpful	2

In most cases, it was impossible to determine which of the

above categories the respondent found to be least useful.

4. Thirty-one of the thirty-seven respondents either returned for a second summer of work in the Second-Year program or indicated that they would like to.

5. Altogether, the respondents provided the names of thirty-one other instructors at their institutions who would be interested in attending the first year of the Institute during the summer of 1966.

6. Twenty-one of the respondents teach courses in two-year data processing programs; five are working at institutions that are in the process of developing curricula for two-year programs. Most of the respondents were not the only teacher at their institution involved in teaching courses in data processing. Eight respondents indicated that they were the only teachers at their schools.

7. Twenty-two of the thirty-seven respondents indicated that they had completed at least one course in the philosophy, history, theory or methodology of vocational education. An investigation of the application forms submitted by all the participants of the 1965 Institute showed that seventeen of the thirty-three participants had received such training.

VI. CONCLUSIONS

The fact that all of the participants in the 1965 Institute finished the program says a great deal in favor of continued financial support for those who attend programs of this nature. The 1965 Institute is considered to have been the best of the three Institutes thus far offered by unanimous opinion of the instructional staff. It was clear during the Institute that the funds that were provided to the participants for the purpose of support and travel contributed greatly to the increased effectiveness of the program. These funds served to promote more vigorous self-application by the participants to the problems and exercises in the Institute. Relieved of financial concerns and of the necessity to work in the evenings, as was the case with several individuals in previous Institutes, the participants were free to concentrate entirely upon their work in the program. Moreover, the hope of being accepted for the Second-Year Program on the same reimbursed basis served as a strong incentive for high-quality work on the part of first-year participants.

The following conclusions can be made from information

gathered from the Student Follow-Up Questionnaire. The numbered paragraphs refer to paragraphs of the same number in the section of this report entitled RESULTS.

1. That the majority of participants left the Institute to take up teaching data processing when prior to the training they received they had not taught data processing is testimony that the program was of value to the e teachers. Furthermore, it can be concluded with reasonable certainty that teachers of business and mathematics can be retrained to function as data processing teachers. There is no question, however, that business and mathematics teachers cannot cope with a data processing teaching assignment without such training. In the words of some of the respondents: "Would have been impossible to teach course without OCC training." "I would hate to be teaching this year without the information I received last summer." "Enjoyed it and could not have done an effective job of teaching without it." These comments, written on the questionnaires, are typical of the verbal remarks made by all of the participants after the close of the 1965 Institute and which are reiterated by participants who return to Orange Coast College to visit and to discuss the development of their own programs.

The crucial test in any teacher-training program, of course, is the final product--the student who studies under the teacher who participated in the training program. A participant who had been teaching data processing prior to attending the First-Year portion of the 1965 Institute indicated on his questionnaire that his "students appear significantly more

successful this time out." Another wrote this: "I feel supremely confident about teaching the course in EAM equipment; this is my first time around; student response has been encouraging." We at Orange Coast College are satisfied that the Summer Institute program as it has been developed here over the last three years is meeting the need for qualified data processing teachers in a vigorous and positive fashion.

2. While hand-out materials were chosen by more participants as the most valuable help, along with unit-record training, it should be noted that most respondents perceived all items as very valuable. The apparent difference between the most valuable contribution to their data processing teaching assignment and the next most valuable or the least valuable was essentially negligible. Generally, the respondents considered the Institute to be of great value to them not only in their new capacities as data processing teachers but personnally as well: "I'M a much more 'marketable' teacher, Rich. With the bottom dropping out of undergraduate business courses, I'm flexible again."

3. Generally, although not always, when it was determinable that a participant felt a category to be of less use than others, it was because he was not assigned to teach a course which considered the area specifically. The teaching staff of the Institute observed that during the eight weeks, each participant knew his teaching assignment for the coming fall. Each participant therefore was eager to prepare himself as thoroughly for that specific assignment as possible. For this reason. topics which were not directed towards fulfilling this pragmatic

purpose were not received favorably. Material covering pedagogy, philosophy of vocational education, and other non-technical matters were almost universally considered to be a waste of the participants' time. The prevailing attitude was that the participants did not come to the Institute to be taught how to teach, but rather to learn what to teach; that the essence of good teaching was thorough knowledge of the subject matter.

Only two respondents felt the entire Institute to be of little use to them in their teaching assignments. One of these, who attended during the 1965 session, had this to say: "I had 15 years EAM and Computer experience before attending the course. It was a wonderful review of it, but I expected something in the way of a methods of teaching course, which this was not." The other, who attended during the 1964 session, did not look to unfulfilled expectations to justify his dissatisfaction: "I believe that I wasted a lot of time during the summer of '64 and I can honestly say that it was the most unpleasant and unproductive educational experience of my career."

4. That most of the respondents either did return for a second summer of work or want to return to a 1966 Summer Institute is evidence of the general high regard the Institute program has in the eyes of the participants. The pace of the Institutes is almost unbearably fast. This was particularly true of the 1965 Institute. While towards the end of the eight-week program, participants began to wear and nerves to fray, a few weeks after the close of the session, the Orange Coast teaching staff began to receive protestations of gratitude for the great quantities of materials presented. As one 1965

participant put it:

> Many thanks to you people -- For two years I didn't attend your summer Institute while everyone else did. When I finally showed up last summer I was amazed. It was beautifully organized, and for the most part beautifully taught program. You worked my fanny off and I was about ready to go over the hill toward the end, but I now know what a great educational experience it was...

5. That so many other business and mathematics teachers are interested in attending Summer Institute programs in data processing attests to the great need for such programs to continue. As of this writing, Orange Coast College has in its files the names of over forty teachers who would like to enroll in the First Year of a Summer Institute during 1966. These names come to us not from formal publicizing of the Institutes, but from word of mouth advertising by participants from the last three summers. With active publicity, we are confident that many more individuals would want to apply for this training program. The resulting numbers of applicants would allow more rigid selection procedures which in turn would improve the quality of future Institutes by increasing the average capability of the participants.

* * *

We at Orange Coast College feel that because of the experience we have gained over the last three years in conducting data processing Institutes and most importantly because of the increased demand for teachers in this field there is even greater justification for continuing the Institutes than there was three years ago when the programs were initiated. Yet we fear that since the California State Department of Education is unable to

support the programs in the future and since, as we have been informed, the United States Department of Health, Education, and Welfare has insufficient funds as provided under Section 4(c) of the Vocational Education Act of 1963 to support the program as it was able to do for the summer of 1965, the Summer Institutes in Data Processing will be discontinued. We believe that this would be a crippling blow to vocational education in the area which is today--and will be more so in the future--the most dynamic and influential occupational field in the United States.

According to a 1965 participant, "If it had not been for the Institute, we at Victor Valley (College) would not have a program of any kind." We anticipate with alarm the programs which will not be developed, the courses which will not be taught, the students who will not be trained in data processing as a vocation if the Summer Institutes are discontinued."

We urge that a way be found to continue the programs under Federal support.

VII. ABSTRACT

Project Number: OE-5-85-096

Title: An Eight-Week Summer Institute Training Program to Retrain Office Education Teachers for Teaching Business Electronic Data Processing.

Principal Investigator: Dr. Norman E. Watson, District Superintendent, Orange Coast Junior College District

Institution: Orange Coast College, 2701 Fairview Road, Costa Mesa, California

Duration: June 21, 1965 to August 13, 1965

Objectives:

1. To retrain teachers with a minimum of three years teaching or work experience in business or office occupation areas for teaching of data processing.
2. To assist with the development of knowledge and skills essential for teaching specialized courses in curricula designed to prepare computer programmers and/or application analysts.
3. To further develop suggested course material including course content, references, visual and other instructional aids suitable for use as patterns and guidelines for future programs.

4. To assist in meeting the urgent national need for teachers of specialized subject matter courses in preparatory data processing curricula.
5. To determine how effectively the above objectives had been accomplished in the view of the participants of the 1963, 1964 and 1965 Institutes.

Conclusions:

The success of the Summer Institute programs in retraining business and mathematics teachers to function as data processing teachers, the numbers of other business and mathematics teachers who want to attend future Summer Institutes in data processing, and the increasing national need for trained operating personnel and qualified teachers in the field of data processing lead to the conclusion that these programs should be continued.

No past invention has had more impact upon the American economy and the American way of life than the technology of automated data processing will have and is exerting at the present time. We at Orange Coast College are satisfied that the Summer Institutes in data processing as they have been developed on this campus over the last three years are prepared to meet the need for qualified data processing teachers in a vigorous and positive fashion.

We understand that it is unlikely that a Summer Institute in data processing for the summer of 1966 will be financed with funds as provided under Section 4(c) of the Vocational Education Act of 1963. At the same time, we are informed that the California State Department of Education will also be unable to finance the program. In view of this, we fear that the

programs will be discontinued at this time when they have reached their peak effectiveness and when the need for them is greater than ever before. We cannot overemphasize the urgency with which we view the necessity to continue the Summer Institutes in data processing under Federal support.

A P P E N D I X I

FIRST-YEAR COURSE OUTLINE

ORANGE COAST COLLEGE

1965

SUMMER INSTITUTE

COURSE OUTLINE

FIRST YEAR

FIRST YEAR GROUP

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
I.	Ssles Analysis Demonstration	1	1	3½		
II.	Unit Record Principles		2	3½	1,2	
	a. Card Codes					
	b. Card Formats					
	c. Card Fields					
	d. Card Reading					
	e. Timing					
	f. 082 General Operation					
III.	Principles of Sorting (082)		3	3½	3,4	
	a. Card Handling					
	b. Selection Switches					
	c. Pockets					
	d. Numerical sorting					
	e. Block Sorting					
	f. Alpha Sorting					
	g. Single Column Selection					
	h. Sort Separating					082
IV.	General Unit Record Principles		4	3½		
	a. Control Panels					
	b. Wires					
	c. Jack Plugs					
	d. Split Wires					
	e. Card Cycle Time					
	f. Print, Read, Punch Time					
	g. Machine Cycles					
	h. Exit Hubs					
	i. Entry Hubs					
	j. Bus Hubs					
V.	548 Operating Principles		5	3½	1	
	a. Print Positions					
	b. X Brushes					
	c. X Eliminators/ Column Splits					
	d. Selectors	2	1	3½	2,3	
	e. X Selection					
	f. Field Selection					
	g. Class Selection		2	3½	4	
	h. Multiple Selection					
	i. Zero Printing					
	j. Zero Suppression					
	k. Review 548 & 082		3	3½		548

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
VI.	514 Operating Principles a. Read Unit b. Punch Unit c. Hoppers/Stackers/Keys d. RX,RD,PD,PX e. X Brushes		4	3½	1	
VII.	Gang Punching Operations a. Gang Punching (Single Master Card) b. Reproduce Switch c. Master/detail Switch d. Selective Reproduce and Gang Punch e. Compare Switch f. Emitting g. Interspersed Master Gang Punching h. Interspersed Gang Puch Comparing i. RX,RD,PD,PX j. Offset Gang Punching Functions k. Offset Gang Punch Comparing	3	5 1	3½ 3½	2 3	
VIII.	Reproducing Operations a. Reproducing b. Field Selected Reproducing and Comparing c. Selective Reproducing d. Combined Reproducing and Gang Punching	2 3	4 3½	3½ 3½	4 5	
IX.	Mark Sensing (514/519)		4	3½		
X.	Other Applications					
XI.	Review and Clean Up Probs.		5	3½		514

TOPIC	WEEK	DAY	HOURS	LAB.EX.	TESTS
I. Key Punch	1	1	3-1/2.		
a. The Unit Record					
1. The IBM Card					
2. Card Fields					
3. Advantages and Disadvantages of Unit Record					
b. IBM Card Punch and Verifier		2	3-1/2	1	
1. Operating Features					
2. Keyboard					
3. Program Unit					
4. Punching Without Program Control					
5. Punching With Program Control					
c. Verification of Punching					
1. Methods of Verification					
2. IBM 056 Card Verifier					
II. General Considerations and History		3	2-1/2		
a. Definition of Data Processing					
b. Historical Overview					
c. Recent Developments					
1. Herman Hollerith					
2. Calculating Machines					
d. The Elements of Data Processing					
1. Classifying					
2. Sorting					
3. Calculating					
4. Summarizing					
5. Recording					
6. Communicating					
III. Systems and Procedures		3	1		
a. The Notion of a System		4	3-1/2	2	
1. Objectives					
2. Decisions					
3. Policies					
4. Procedures					
5. Systems					
b. System Analysis: Flow Charts		5	3-1/2	4	
1. Procedural Flow Charts					
2. General Flow Charts					
3. Block Diagrams					
c. PERT: An Example of System Analysis					
IV. Number Systems and Calculations	2				
a. Number Systems in General		1	3-1/2		
1. Decimal Considerations					
2. Binary Considerations					
b. Conversion Techniques: Binary vs. Decimal		2	3-1/2	5	
1. Decimal to Binary					
2. Binary to Decimal					

TOPIC	WEEK	DAY	HOURS	LAB.EX.	TESTS
c. A Number of Number Systems		3	3-1/2	6	
1. Binary, Tertiary, Quinary Octal, Decimal, Hexadecimal, etc.					
2. More Conversion Techniques					
d. Non-Decimal Multiplication and Division		4	3-1/2	7	
e. Complementary Operations					
V. Date Storage and Recording Devices		5	3-1/2	8	
a. Representation of Data					
1. Binary Coded Decimal (BCD)					
2. Seven-bit Alphameric Code					
b. Recording/Storing Devices					
1. Paper					
2. Typewriter					
3. Other Business Machines					
4. Punched Cards					
5. Punched Paper Tape					
6. The Flex-o-writer					
7. Magnetic Tape					
8. Disk Storage					
9. Random vs. Sequential Storage					
c. Memory Devices	3	1	3-1/2		
1. Drum Storage					
2. Core Storage					
3. Mercury Pool					
VI. Electronic Data Processing		2	3-1/2		
a. Computers in General					
1. Memory Devices					
2. The Elements of a Computer					
b. The Cradiac, World's Slowest Computer		3	3-1/2	9	
c. The LGP-30		4	3-1/2	10	
1. Memory					
2. Data and Instruction Words					
3. Programming					
d. Review		5	3-1/2		

First Year Group (T) 5.

UNIT - IBM 1620 Data Processing System

TOPIC	WEEK	DAY	HOURS	LAB.EX.	TESTS
I. 1620 Storage	4	1	1/2		
II. Instruction Format			1/2		
III. Digit Instructions			2	1	
IV. Setting Flags in Instructions		2	1/2		
V. Address Arith			1/2		
VI. Halt & No-op			2-1/2		
VII. Conditional Instr.		3	2		
VIII. Arithmetic Instr.			2		
IX. Input/Output Oper		4	2		
X. Loading A Prog From Cards			1		
XI. Completion of Lab		5	4	2	

085 COLLATOR

TOPIC	WEEK	DAY	HOURS	LAB.EX.	TESTS
I. Introduction	4	1	1		
a. Machine Functions					
1. Card Selection					
2. Checking Sequence					
3. Merging					
4. Merging with Selection					
5. Matching					
b. Machine Features					
c. Machine Schematic					
II. Operations		1	2-1/2		
a. Merging Two Groups of Unpunched Cards					
b. Selecting X Cards				1	
c. Blank Column Detection		2	3-1/2	2	
d. Checking Sequence				3 and 4	
e. Recognizing a Change Between Control Groups					
1. Selecting the Last Card of a Group		3	3-1/2	5	
2. Selecting the Last Card of a Group if an X Card					
3. Selecting the First Card of a Group					
4. Selecting Single or Multiple Card Groups				6	
f. Selecting Zero Balance Cards				7	
g. Comparing Two Fields in the Same Card in Either Feed		4	3-1/2		
h. Selecting Cards by a Control Number				8	
i. Selecting Cards with a Control Number from Interspersed X Finder					
j. Selecting Cards Between Two Control Numbers					
III. Merging (Functional)		5	3-1/2		
a. General					
b. Merging Single Primaries and Single Secondaries					
c. Merging Single Primaries and Single or Multiple Secondaries					
d. Merging Multiple Primaries, Single or Multiple Secondaries					
e. Merging with Selection	5	1	3-1/2		
1. With Single Secondaries				9	
2. With Multiple Secondaries				10	

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
IV.	Matching (Functional)	5	2	3-1/2	11	
V.	Basic Set Up Switches				12	
VI.	Special Devices a. Alphabetic Collating Device b. Split Selector and Sequence Unit Device c. Collator Counting Device					
VII.	Review & Test					085

402 ACCOUNTING MACHINE

TOPIC	WEEK	DAY	HOURS	LAB.EX.	TESTS
I. Introduction	5	3	3-1/2		
a. General					
1. Card Feeding, Reading Stations					
2. Speed					
3. Typebars					
b. Operating Switches and Signals					
II. Printing - Detail					
a. Numerical Information - Detail					
b. Alphabetic Information - Detail				1	
c. Zero Printing-Hammersplit Levers					
III. Addition					
a. Counter Control					
b. Basic Steps in Addition					
c. Use of Final Total				2	
IV. Selection - Pilot Selectors	5	4	3-1/2		
a. Pilot Selector Operation					
1. X Pick Up					
2. D Pick Up					
3. I Pick Up					
b. Examples of Uses					
V. Co-Selectors					
a. Operation					
VI. Subtraction					
a. Counter Operation					
b. Use of C1 to C, negative balance control, and Credit Symbol Exit					
VII. Program Control	5	5	3-1/2		
a. Operation					
b. Levels of Programs					
c. Asterisk Symbol Exit					3
VIII. Group Printing					
a. Definition					
b. Operation					4
IX. Digit Selection	6	1	3-1/2		
a. Digit Control					
b. Operation					
c. Examples					6

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
X.	Total Transfer; Group Indication	6	2	3-1/2		
	a. Same Typebars				7	
	b. Different Typebars				8	
XI.	Counter Coupling	6	3	3-1/2		
XII.	Group Indication					
XIII.	Field and Class Selection					
	a. Illustration					
	b. Examples				9	
XIV.	Set Up Change Switches	6	4	3-1/2	10	
XV.	Summary Punching					
XVI.	Tape Control Carriage				11	
XVII.	Review and Test	6	5	3-1/2		402

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
I.	360 Computer a. Review b. 360 Film	5	1	3½		
II.	1620 Fortran Programming a. Overview of Fortran 1. Compiler 2. Subroutines b. I/O Fixed Point c. Format Statements		2	3½	1	
III.	Fortran Statements a. Overview 1. Input/output 2. Arithmetic 3. Control 4. Specification 5. I/O Fixed & Floating 6. Rules Governing Statements		3	3½	2	
IV.	Arithmetic Statements a. +,-,*,**,/ b. Business Application Ex:S=P(+R)^4		4		3	
V.	Additional I/O Statements a. Input: Read, Accept, Fetch b. Output: Type, Punch, Record					
VI.	Program Flow (Control) a. Go to b. Computed go to c. If d. Pause e. Stop f. End g. Do h. Nested do i. Continue j. Sense Switch	6	1 2	3½ 3½	4	
VII.	Statistical Program a. Coeficient of Correlation b. Frequency Distributions c. Measures of Central Tendency		3	3½	5	
VIII.	Pearson Product Moment of Correlation		4	3½		
IX.	Review		5		1620 Fortran	

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
VII.	Coding Systems	7	1	3½		
	a. Coding Systems: General					
	1. General					
	2. Scientific Notation					
	3. Modular Arithmetic					
	b. Coding Systems: Specific		2	3½		
	1. Gray Code (Reflected number systems)					
	2. 2• 4 2 1 Code					
	3. Excess 3 Code					
	4. Bi-quinary					
	5. Two-out-of-five Code					
	6. Hamming self-correcting Code					
	7. Code Choice					
VIII.	Programming Systems		3	3½		
	a. Machine Language vs. the King's English					
	1. The Parts of A Programming System					
	2. Advantages of Programming Systems					
	b. Types of Programming Systems		4	3½		
	1. Machine-oriented Systems					
	2. Procedure-oriented Systems					
	c. Systems Choice		5	3½		
IX.	McBee Keysort System	8	1	3½	11	
X.	Applications		2	3½		
	a. Payroll					
	b. Accounts Receivable					
	c. Accounts Payable					
	d. Inventory Control					
	e. Production Control					
XI.	Organization and Data Processing		3	3½		
	a. Business as an Organization					
	b. Formal Organization vs. Informal Organization					
	c. The Place of Data Processing in the Organization					
XII.	Industrial and Societal Implications		4	3½		
XIII.	Review		5	3½		

A P P E N D I X I I

SECOND-YEAR COURSE OUTLINE

ORANGE COAST COLLEGE

1965

SUMMER INSTITUTE

COURSE OUTLINE

SECOND YEAR

SECOND YEAR GROUP

TOPIC	WEEK	DAY	HOURS	LAB. EX.	TESTS
I. IBM 1620 Data Processing System Intermediate & Advanced Topics					
1620 Storage	1	1	1		
Instr. Format			2		
Digit Instructions			3	1	
Field Instructions		2	2		
Flag Usage			1		
Address Arithmetic			3	2	
Conditional Instr.			2		
Arithmetic Instr.		3	7	3	
I/Ø Operations		4	2		
Loading a Program			1		
Symbolic Prog. Syst.			1		
SPS Processor			1		
SPS Coding Sheet			1		
Declaratives			2		
Processor Control		5	1		
Symbolic Instr.	2	1	7	4	
Arithmetic Instr.		2	3		
Branch Commands		3	5	5	
Editing			1		
Comparing		4	5	6	
Fortran Intro.			2		
I/Ø Instr.			6	7	
Arithmetic Instr.		5	3		
Conditional Instr.	3	1	5	8	
Specification			6	9	
Fortran II		2	2		
Subprograms			6	10	
Disk Intro.		3	1		
Monitor Concept			1		
SPS New Features			2		
Fortran Macros			2		
Disk Utility			2		
Macros		4	8	11	
Complete Assn.		5	8		

SECOND YEAR GROUP

TOPIC	WEEK	DAY	HOURS	LAB. EX.	TESTS
I. General 1401 Operating Principles	4	1	7	1	
a. Reader Punch Unit					
b. 1403 Printer					
c. 1401 CPU (Console & AUX Console)					
1. Core Dump					
2. Clearing and Inserting					
d. Storage Organization					
II. Machine Language (1401)					
a. Instruction Format					
b. Input/output Instruction					
c. Internal Registers					
d. Basic Commands					
III. 1401 SPS		2	7		
a. SPS Definition					
b. SPS Processor					
c. SPS Coding Sheet					
d. Declaratives					
e. Basic Symbolic Instructions		3	7	2	
f. Processor Control Instructions					
g. Basic Arithmetic Instructions		4	7	3	
h. Basic Branch Commands					
i. Basic Editing		5	7		
j. Basic Comparing					
k. Basic Document Control				1401	

SECOND YEAR GROUP

TOPICS	WEEK	DAY	HOURS	LAB.EX.	TESTS
I. IBM 1401 Data Processing System Advanced Topics	5				
a. Address Modification		1	7	1	
b. Index Registers		2	7	2	
c. Subroutine Usage		3	7	3	
d. Programmed Switches		4	7	4	
e. Magnetic Tape Concepts		5	7		
II. Computer Programming Systems					
a. CPS Advantages & Disadvantages	6	1	1		
b. Assembly Systems			2		
c. Input/Output Control Systems		2	7		
d. Random Access Tech.			5		
e. Cobol		3,4	16	1	
f. Report Program Gen.		5	3		
g. Sort Systems	7	1	6		
h. Simulator Systems		2,3,4	23	2	

SECOND YEAR GROUP

TOPIC		WEEK	DAY	HOURS	LAB.EX.	TESTS
I.	Background of Systems Work	7	5	3		
II.	Organization Theory & Design		5	4		
III.	Management Theory & Practice	8	1	3		
IV.	The Systems Survey			3		
V.	Flow Charting			1		
VI.	Forms Design & Control		2	1		
VII.	Selling Systems Work			1		
VIII.	Record Retention & Control			1		
IX.	Work Measurement			4		
X.	PERT		3	3		
XI.	Information Retrieval			3		
XII.	EDP and the Total Systems Concept					
	a. Input/Output Devices			1		
	b. Real time vs. Batch Processing	4		2		
	1. (Data Collection Systems					
	2. (Random Access Memories			2		
	c. Data Transmission			1		
	d. Test					Systems

PROJECT - WEEK 8, DAY 5

A presentation of a conversion from a manual and mechanical business system to an EDP system. Topics for analysis and discussion will include the feasibility study, redesign of system for EDP, selling the study, planning and scheduling the change over, orientation and training of personnel, public relations, programming for EDP system, debugging the system, site preparation, equipment and system installation, parallel running and change over to new system, follow up and evaluations.

A P P E N D I X I I I

STUDENT FOLLOW-UP QUESTIONNAIRE

ORANGE COAST COLLEGE

SUMMER INSTITUTE IN DATA PROCESSING

STUDENT FOLLOW-UP

Name _____

School _____

1. Please list the data processing courses by course title you have taught in the past. Indicate the number of units and hours involved for each course.

Fall, 1961	Spring, 1962
Fall, 1962	Spring, 1963
Fall, 1963	Spring, 1964
Fall, 1964	Spring, 1965

2. Please list the courses you are now teaching in Data Processing.

3. Please list the courses in Data Processing you expect to teach in the future. Again, list the hours and units for each course.

Spring, 1966	
Fall, 1966	Spring, 1967

4. How has your experience with Orange Coast's Summer Institute(s) in Data Processing helped you with the above assignments?

   a. In terms of hand-out materials received.

   b. In terms of bibliographical materials received.

   c. In terms of course outlines developed at the institute.

   d. In terms of historical background.

   e. In terms of mathematical background.

   f. In terms of EAM equipment.

   g. In terms of Computer programming.

   h. In general.

5. If you are considering returning next summer for the second-year program, what would you most like to study?

6. Are there others at your school who might be interested in attending the first-year program of the Institute next summer? What are their names and departments?

7. Does your school have a two-year program in Data Processing? If so, will you please send us your current catalog?

8. Please list the instructors at your school who are teaching courses in data processing.

Instructor	Course	Units

9. Please indicate the equipment available to your educational program in Data Processing below.

10. Do you feel that this equipment is adequate for your program? What additions or changes do you anticipate in the future?

11. Do you feel that there is adequate administrative support for your Data Processing program at your school?

12. Below, please list the courses you have taken, by course title, that concerned themselves with vocational education, its philosophy, history, theory, or methodology.

Many, many thanks.